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Remarks

This application has been reviewed in light of the Nonfinal Office Action of March 23, 2007. Claims 1-18 are pending, and all claims are rejected. In response, claims 1, 10, 14, and 15 are amended; claim 2 is cancelled, without prejudice; and the following remarks are submitted. Reconsideration of this application, as amended, is requested.

Claim 15 is objected to and has been responsively corrected.

Ground 1. Claims 1, 2, 3, 4, 6, 7, 9, 10, 11, 13, 15, and 16 are rejected under 35 USC 102 as anticipated by Lindmayer U.S. Patent 4,124,455. Applicant traverses this ground of rejection.

The following principle of law applies to §102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under §102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.' Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985).

Thus, identifying a single element of the claim, which is not disclosed in the reference, is sufficient to overcome a §102 rejection.

Amended claim 1 recites in part:

"a front electrical lead overlying and affixed to an attachment pad region of the joining layer of the front electrical contact"

Lindmayer does not disclose a front electrical lead.

The explanation of the rejection argues that "A front electrical lead attached to the busbar or an attachment pad is necessary to extract any electricity from the cell and thus would inherently be present." Lindmayer does not disclose either a busbar or an attachment pad--these are concepts drawn from the present disclosure and claims. The

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only relevant question as to Lindmayer is whether a front electrical lead would be attached to the grid that is disclosed in Lindmayer.

MPEP 2112-2113 sets forth the law on inherency. Inherency is not to be taken lightly and not to be asserted unless there is good evidence to suggest that the asserted property or characteristic is necessarily present in the teachings of the prior art reference. The concept of inherency is not provided as a way to fill in the gaps in missing disclosure or teachings based upon speculation, unless the asserted property or characteristic may be shown to be necessarily present by objective evidence. Instead, "inherency" is used when every aspect of the disclosure of a reference and the claimed subject matter is otherwise exactly the same, then it may be inferred that some property or characteristic further recited in the claim must necessarily be present in the art reference. MPEP 2112 provides "The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijklaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)."

Applicant asks that, if the rejection is maintained, there be a showing that the electrical lead would necessarily be affixed to the grid that is disclosed in Lindmayer in the manner recited in the present claims. Applicant believes that it will not be possible to demonstrate such inherency, particularly in view of the assertion that it is inherent that the "front electrical lead [is] attached to the busbar or an attachment pad," neither of which is part of the grid disclosed in Lindmayer.

Lindmayer does not disclose the entire front-side electrical system of the solar cell. Lindmayer discloses only the grid, and does not disclose a busbar, an attachment pad, or a front electrical lead. Lindmayer has no drawing to suggest how the grid is interrelated to other components of the front-side electrical system. There is no reason to assume anything about the rest of the front-side electrical system.

Amended claim 1 further recites in part:

"the titanium layer is not so thick that it prevents diffusion of the metal from the diffusion layer to the active semiconductor structure front side"

Lindmayer neither discloses nor teaches this limitation.

Amended claim 10 recites in part:

"the titanium layer has a thickness of from about 50 Angstroms to about 250 Angstroms"

Claim 10 was amended to insert this limitation from claim 14. This limitation of claim 10 is not disclosed by Lindmayer.

However, Applicant will address the argument regarding this limitation from the Ground 2 rejection. The explanation of the rejection argues (last two paragraphs on page 5 of the Office Action) that "...it would be obvious to choose layer thicknesses within the ranges of the present claims for the electrode of Lindmayer." Applicant disagrees. Lindmayer discloses a permissible range of 500-600 Angstroms (col. 3, line 61). Lindmayer's disclosure and teachings permit adjustment within this disclosed range, but not outside it. If the range of values recited in claim 10 overlapped with the range of values of Lindmayer, then a possible case of obviousness could be made. That is not the case.

As stated in para. [0030] of the present application,

"Preferably, the titanium layer 42 has a thickness of from about 50 Angstroms to about 250 Angstroms...The titanium layer 42 must be sufficiently thick to achieve full coverage over the active semiconductor structure front side 24, but not so thick that it prevents diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24."

The maximum thickness of the titanium layer 42 is selected for reasons not disclosed, taught, or contemplated by Lindmayer, ensuring that the titanium layer 42 does not prevent diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24. Lindmayer has no conception of this reasoning, and accordingly has set the minimum thickness of the layer of titanium group metal to be much thicker than permissible in the present approach.

The explanation of the rejection argues that "Thinner layers utilize less material and thus can improve the cost of the device." There are two responses. First, surely Lindmayer

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recognized this argument, but chose not to make the layer thinner. Second, the difference in the amount of metal between 250 Angstroms and 500 Angstroms is negligible based on cost considerations. In such a device, considerations of performance vastly outweigh those of a negligible cost difference. In fact, Lindmayer chose his thickness range for the reason of adherence (col. 3, line 3), and found that 500-600 Angstroms was required for his purposes.

Thus, Applicant has described the unexpected results obtained with the thinner titanium layer and set forth the layer thickness that achieves these unexpected results.

Ground 2. Claims 8, 14, 18, and 19 are rejected under 35 USC 103 over Lindmayer '455. Applicant traverses this ground of rejection.

To form a prima facie §103 rejection, MPEP 2142 requires that "the prior art reference (or references when combined) must teach or suggest all the claim limitations." In this regard, the following principle of law applies to all §103 rejections. MPEP 2143.03 provides "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 8 depends from claim 1. Lindmayer does not teach the limitations of claim 1 for the reasons stated above in relation to the Ground 1 rejection and which are incorporated here. Accordingly, Lindmayer cannot teach the limitations of claim 8.

Claim 8 additionally recites in part:

"the titanium layer has a thickness of from about 50 Angstroms to about 250 Angstroms,

the diffusion layer has a thickness of from about 100 Angstroms to about 600 Angstroms,

the barrier layer has a thickness of from about 100 Angstroms to about 1000 Angstroms, and

the joining layer has a thickness of from about 20,000 Angstroms to about 70,000 Angstroms."

The other rejected claims have similar recitations in relevant part.

The explanation of the rejection argues (last two paragraphs on page 5 of the Office Action) that "...it would be obvious to choose layer thicknesses within the ranges of the present claims for the electrode of Lindmayer." Applicant disagrees. Lindmayer discloses a permissible range of 500-600 Angstroms (col. 3, line 61). Lindmayer's disclosure and teachings permit adjustment within this disclosed range, but not outside it. If the range of values recited in claim 10 overlapped with the range of values of Lindmayer, then a possible case of obviousness could be made. That is not the case.

As stated in para. [0030] of the present application,

"Preferably, the titanium layer 42 has a thickness of from about 50 Angstroms to about 250 Angstroms...The titanium layer 42 must be sufficiently thick to achieve full coverage over the active semiconductor structure front side 24, but not so thick that it prevents diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24."

The maximum thickness of the titanium layer 42 is selected for reasons not disclosed, taught, or contemplated by Lindmayer, ensuring that the titanium layer 42 does not prevent diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24. Lindmayer has no conception of this reasoning, and accordingly has set the minimum thickness of the layer of titanium group metal to be much thicker than permissible in the present approach.

The explanation of the rejection argues that "Thinner layers utilize less material and thus can improve the cost of the device." There are two responses. First, surely Lindmayer recognized this argument, but chose not to make the layer thinner. Second, the difference in the amount of metal between 250 Angstroms and 500 Angstroms is negligible based on cost considerations. In such a device, considerations of performance vastly outweigh those of a negligible cost difference. In fact, Lindmayer chose his thickness range for the reason of adherence (col. 3, line 3), and found that 500-600 Angstroms was required for his purposes.

Thus, Applicant has described the unexpected results obtained with the thinner titanium layer and set forth the layer thickness that achieves these unexpected results.

Ground 3. Claim 5 is rejected under 35 USC 103 over Lindmayer in view of Yin U.S. Patent 5,103,268. Applicant traverses this ground of rejection.

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]. See MPEP para 2143-2143.03 for decisions pertinent to each of these criteria."

First requirement--there must be an objective basis for combining the teachings of the references.

The first of the requirements of MPEP 2142 is that "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings." The present rejection is a §103 combination rejection. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2142, 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

"The PTO has the burden under §103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

"One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

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"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

* * * * *

"A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure.

In this case, the references provide strong motivations not to combine the teachings. Lindmayer's selection of the layer that is a mixture of the titanium group metal and platinum group metal, to overlie the titanium layer, is not arbitrary and is made to solve a particular problem that Lindmayer perceived. Lindmayer teaches that "I have solved the problem of adherence between the titanium and platinum by interfacing the titanium and platinum layers with a layer comprising a mixture of both platinum and titanium. I have found that by providing such an interface layer, the normal problems of adherence between titanium and platinum is overcome, and that there is firm and lasting adherence between the titanium and platinum group metals. With such firm adherence, there is no difficulty in securing the platinum group metal directly to the body of the solar cell, and with the platinum group metal in position, there is no problem in applying a relatively large mass of silver directly on the platinum group layer by an economical means." (col. 3, lines 13-27).

That is, Lindmayer teaches that there must be a mixed layer of titanium and platinum between the layers of titanium and platinum, for his invention to be operable.

The proposed combination of teachings goes directly against this requirement of Lindmayer by seeking to replace the mixed titanium-platinum layer with gold. It is a well-established principle of law that a prima facie case of obviousness may not properly be based on a reference which teaches away from the present invention as recited in the claims.

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. In re Sponnoble, 160 USPQ 237, 244 (CCPA 1969)...As "a useful general rule,"..."a reference that 'teaches away' can not create a prima facie case of obviousness." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)."

There is no basis for attempting to insert a gold layer instead of (or in addition to) the mixed titanium-platinum layer.

If the rejection is maintained, Applicant asks that the Examiner set forth the objective basis found in the references themselves for combining the teachings of the references, and for adopting only the helpful teachings of each reference and disregarding the unhelpful teachings of the reference. Thus, as it stands now, the invention as a whole is not prima facie obvious over the combined teachings of the prior art.

The arguments regarding pinhole-type defects and the like are not pertinent, because Lindmayer does not suggest any problem with pinhole-type defects. There is no motivation to solve a pinhole-type defects problem in Lindmayer using technology from Yin, because Lindmayer does not have such a problem.

Second requirement--there must be an expectation of success.

The second of the requirements of MPEP 2142 is an expectation of success. There is no expectation of success...This requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner's argument is required here.

As stated in MPEP 2142, "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]."

As noted above, it may be expected from Lindmayer that there would be a lack of success in the proposed approach. Insertion of the gold layer would prevent contact between the mixed titanium-platinum layer and the non-mixed titanium and platinum layers on either side of it, as absolutely required by Lindmayer.

Third requirement--the prior art must teach the claim limitations.

The third of the requirements of MPEP 2142 is that "the prior art reference (or references when combined) must teach or suggest all the claim limitations." In this regard, the following principle of law applies to all §103 rejections. MPEP 2143.03 provides "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 5 depends from claim 1, which recites in part:

"a titanium layer overlying and contacting the active semiconductor structure front side,

a diffusion layer overlying and contacting the titanium layer, wherein the titanium layer is not so thick that it prevents diffusion of the metal from the diffusion layer to the active semiconductor structure front side,

a barrier layer overlying and contacting the diffusion layer, and
a joining layer overlying and contacting the barrier layer"

The rejection of claim 5 must still teach these claim limitations, and the explanation of the rejection does not propose how this requirement is to be met. If the proposed gold layer is inserted between the recited titanium layer and the recited diffusion layer, then the claim 1 limitation cannot be met by the combination of teachings because Lindmayer teaches that the mixed titanium-platinum layer must contact its titanium layer and its platinum layer in order to achieve adherence. If the proposed gold layer is to be substituted for the diffusion layer, then the central adhesion teaching of Lindmayer is to be thrown out because it is no longer met.

If the rejection is maintained, Applicant asks for clarification as to exactly the arrangement of layers that is being proposed in the rejection. Does the proposed gold layer replace the mixed titanium-platinum layer taught by Lindmayer, or is it in addition to Lindmayer's mixed titanium-platinum layer? Clearly the proposed substitution is not evident from the cited art.

Ground 4. Claim 12 is rejected under 35 USC 103 over Lindmayer in view of Morita U.S. Patent 4,468,853. Applicant traverses this ground of rejection.

The explanation of the rejection asserts that the difference between the teaching of Lindmayer and the recitation of claim 12, incorporating the limitations of claim 10, is the requirement of sequential vacuum deposition (Office Action, page 7, lines 3-4). That is in part the difference, but claim 10 further recites "a single pumpdown from ambient pressure."

The MPEP 2142 requirements for the §103 rejection are as discussed above.

First requirement--there must be an objective basis for combining the teachings of the references.

Lindmayer expressly teaches away from depositing all of the layers in a single pumpdown from ambient pressure. Lindmayer discusses vapor deposition of the silver layer, and teaches away from this approach; see col. 1, lines 64-65; col. 2, lines 40-48; and col. 2, lines 60-68. Lindmayer instead applies the silver layer by electroplating (col. 4, lines 8-38), which is definitely not a vacuum deposition process.

Morita teaches a mixed bag of deposition techniques such as sputtering, mask evaporation, plating, chemical vapor deposition, and magnetron sputtering. There is no teaching of a single pumpdown, because these techniques cannot be practiced in a single pumpdown.

Second requirement--there must be an expectation of success.

No basis in the references for an expectation of success in meeting the claim limitation is set forth.

Third requirement--the prior art must teach the claim limitations.

Claim 12 incorporates the limitations of claim 10, which are not taught by the references for the reasons stated earlier.

Claim 12 further recites in part:

"sequentially vacuum depositing the titanium layer, the diffusion layer, the barrier layer, and the joining layer in a vacuum deposition apparatus in a single pumpdown from ambient pressure."

Neither reference teaches that all of the layers could be deposited by vacuum deposition. Neither reference teaches that all of the layers could be deposited in a vacuum deposition apparatus in a single pumpdown from ambient pressure. In fact, both references teach that at least one layer is deposited by electrodeposition, which is not a vacuum deposition process at all.

Ground 5. Claims 17 and 20 are rejected under 35 USC 103 over Lindmayer in view of Yin and Morita. Applicant traverses this ground of rejection.

The MPEP 2142 requirements for the §103 rejection are as discussed above.

First requirement--there must be an objective basis for combining the teachings of the references.

In this case, the references provide strong motivations not to combine the teachings. Lindmayer's selection of the layer that is a mixture of the titanium group metal and platinum group metal, to overlie the titanium layer, is not arbitrary and is made to solve a particular problem that Lindmayer perceived. Lindmayer teaches that "I have solved the problem of adherence between the titanium and platinum by interfacing the titanium and platinum layers with a layer comprising a mixture of both platinum and titanium. I have found that by providing such an interface layer, the normal problems of adherence between titanium and platinum is overcome, and that there is firm and lasting adherence between the titanium and platinum group metals. With such firm adherence, there is no difficulty in securing the platinum group metal directly to the body of the solar cell, and with the platinum group metal in position, there is no problem in applying a relatively large mass of silver directly on the platinum group layer by an economical means." (col. 3, lines 13-27).

That is, Lindmayer teaches that there must be a mixed layer of titanium and platinum between the layers of titanium and platinum, for his invention to be operable.

The proposed combination of teachings goes directly against this requirement of Lindmayer by seeking to replace the mixed titanium-platinum layer with gold. It is a well-established principle of law that a prima facie case of obviousness may not properly be based on a reference which teaches away from the present invention as recited in the claims.

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. In re Sponnoble, 160 USPQ 237 244 (CCPA 1969)...As "a useful general rule,"..."a reference that 'teaches away' can not create a prima facie case of obviousness." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)."

There is no basis for attempting to insert a gold layer instead of (or in addition to) the mixed titanium-platinum layer.

Lindmayer expressly teaches away from depositing all of the layers in a single pumpdown from ambient pressure. Lindmayer discusses vapor deposition of the silver layer, and teaches away from this approach; see col. 1, lines 64-65; col. 2, lines 40-48; and col. 2, lines 60-68. Lindmayer instead applies the silver layer by electroplating (col. 4, lines 8-38), which is definitely not a vacuum deposition process.

Morita teaches a mixed bag of deposition techniques such as sputtering, mask evaporation, plating, chemical vapor deposition, and magnetron sputtering. There is no teaching of a single pumpdown, because these techniques cannot be practiced in a single pumpdown.

Second requirement--there must be an expectation of success.

No basis in the references for an expectation of success in meeting the claim limitation is set forth.

As noted above, it may be expected from Lindmayer that there would be a lack of success in the proposed approach. Insertion of the gold layer would prevent contact between the mixed titanium-platinum layer and the non-mixed titanium and platinum layers on either side of it, as absolutely required by Lindmayer.

Third requirement--the prior art must teach the claim limitations.

Claim 17 recites in part:

"affixing a front electrical lead overlying and contacting an attachment pad region of the front electrical contact."

Lindmayer does not disclose a front electrical lead.

The explanation of the rejection argues that "A front electrical lead attached to the busbar or an attachment pad is necessary to extract any electricity from the cell and thus would inherently be present." Lindmayer does not disclose either a busbar or an attachment pad--these are concepts drawn from the present disclosure and claims. The only relevant question as to Lindmayer is whether a front electrical lead would be attached to the grid that is disclosed in Lindmayer.

MPEP 2112-2113 sets forth the law on inherency. Inherency is not to be taken lightly and not to be asserted unless there is good evidence to suggest that the asserted property or characteristic is necessarily present in the teachings of the prior art reference.

The concept of inherency is not provided as a way to fill in the gaps in missing disclosure or teachings based upon speculation, unless the asserted property or characteristic may be shown to be necessarily present by objective evidence. Instead, "inherency" is used when every aspect of the disclosure of a reference and the claimed subject matter is otherwise exactly the same, then it may be inferred that some property or characteristic further recited in the claim must necessarily be present in the art reference. MPEP 2112 provides "The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)."

Applicant asks that, if the rejection is maintained, there be a showing that the electrical lead would necessarily be affixed to the grid that is disclosed in Lindmayer in the manner recited in the present claims. Applicant believes that it will not be possible to demonstrate such inherency, particularly in view of the assertion that it is inherent that the "front electrical lead [is] attached to the busbar or an attachment pad," neither of which is part of the grid disclosed in Lindmayer.

Lindmayer does not disclose the entire front-side electrical system of the solar cell. Lindmayer discloses only the grid, and does not disclose a busbar, an attachment pad, or a front electrical lead. Lindmayer has no drawing to suggest how the grid is interrelated to other components of the front-side electrical system. There is no reason to assume anything about the rest of the front-side electrical system.

Claim 17 further recites in part:

"a titanium layer overlying and contacting the active semiconductor structure front side,
a gold layer overlying and contacting the titanium layer,
a platinum layer overlying and contacting the gold layer, and

a silver layer overlying and contacting the platinum layer.”

The rejection must teach all of these claim limitations, and the explanation of the rejection does not propose how this requirement is to be met. If the proposed gold layer is inserted between the recited titanium layer and the recited diffusion layer, then the claim 1 limitation cannot be met by the combination of teachings because Lindmayer teaches that the mixed titanium-platinum layer must contact its titanium layer and its platinum layer in order to achieve adherence. If the proposed gold layer is to be substituted for the diffusion layer, then the central adhesion teaching of Lindmayer is to be thrown out because it is no longer met.

If the rejection is maintained, Applicant asks for clarification as to exactly the arrangement of layers that is being proposed in the rejection. Does the proposed gold layer replace the mixed titanium-platinum layer taught by Lindmayer, or is it in addition to Lindmayer's mixed titanium-platinum layer?

Claim 17 further recites in part:

“the step of applying includes the step of sequentially vacuum depositing the titanium layer, the gold layer, the platinum layer, and the silver layer in a vacuum deposition apparatus in a single pumpdown from ambient pressure.”

None of the references teach that all of the layers could be deposited by vacuum deposition. Neither reference teaches that all of the layers could be deposited in a vacuum deposition apparatus in a single pumpdown from ambient pressure. In fact, the references teach that at least one layer is deposited by electrodeposition, which is not a vacuum deposition process at all.

Claim 20 recites in part:

“applying the titanium layer to a thickness of from about 50 Angstroms to about 250 Angstroms.”

The explanation of the rejection argues (third paragraph on page 9 of the Office Action) that “...it would be obvious to choose layer thicknesses within the ranges of the present claims for the electrode of Lindmayer.” Applicant disagrees. Lindmayer discloses a permissible range of 500-600 Angstroms (col. 3, line 61). Lindmayer's disclosure and teachings permit adjustment within this disclosed range, but not outside it. If the range of values recited in

claim 20 overlapped with the range of values of Lindmayer, then a possible case of obviousness could be made. That is not the case.

As stated in para. [0030] of the present application,

"Preferably, the titanium layer 42 has a thickness of from about 50 Angstroms to about 250 Angstroms...The titanium layer 42 must be sufficiently thick to achieve full coverage over the active semiconductor structure front side 24, but not so thick that it prevents diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24."

The maximum thickness of the titanium layer 42 is selected for reasons not disclosed, taught, or contemplated by Lindmayer or the other references, ensuring that the titanium layer 42 does not prevent diffusion of the metal from the diffusion layer 44 to the active semiconductor structure front side 24. Lindmayer and the other references have no conception of this reasoning, and accordingly have set the minimum thickness of the layer of titanium group metal to be much thicker than permissible in the present approach.

The explanation of the rejection argues that "Thinner layers utilize less material and thus can improve the cost of the device." There are two responses. First, surely Lindmayer recognized this argument, but chose not to make the layer thinner. Second, the difference in the amount of metal between 250 Angstroms and 500 Angstroms is negligible based on cost considerations. In such a device, considerations of performance vastly outweigh those of a negligible cost difference. In fact, Lindmayer chose his thickness range for the reason of adherence (col. 3, line 3), and found that 500-600 Angstroms was required for his purposes.

Thus, Applicant has described the unexpected results obtained with the thinner titanium layer and set forth the layer thickness that achieves these unexpected results.

Applicant asks that the Examiner reconsider and withdraw the rejections.

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CONCLUSION

For at least the reasons set forth above, Applicant respectfully requests reconsideration of the Application and withdrawal of all outstanding objections and rejections. Applicant respectfully submits that the claims are not anticipated by, nor rendered obvious in view of; the cited art either alone or in combination and thus, are in condition for allowance. Thus, Applicant requests allowance of all pending claims in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant's undersigned representative.

This Response has been filed within three (3) months of the mailing date of the Office Action and it is believed that no fees are due with the filing of this paper. In the event that Applicant is mistaken in these calculations, applicant requests any extension of time that may be necessary and the Commissioner is hereby authorized to deduct any fees determined by the Patent Office to be due from the undersigned's Deposit Account No. 50-1059.

Dated: May 31, 2007

Respectfully submitted,

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